Designation: A 992/A 992M – 04a

Standard Specification for Structural Steel Shapes[1]

This standard is issued under the fixed designation A 992/A 992M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers rolled steel structural shapes for use in building framing or bridges, or for general structural purposes.

1.2 Supplementary requirements are provided for use where additional testing or additional restrictions are required by the purchaser. Such requirements apply only when specified in the purchase order.

1.3 When the steel is to be welded, a welding procedure suitable for the grade of steel and intended use or service is to be utilized. See Appendix X3 of Specification A 6/A 6M for information on weldability.

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system is to be used independently of the other without combining values in any way.

1.5 The text of this specification contains notes or footnotes, or both, that provide explanatory material; such notes and footnotes, excluding those in tables and figures, do not contain any mandatory requirements.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 6/A 6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 673/A 673M Specification for Sampling Procedure for Impact Testing of Structural Steel

E 112 Test Methods for Determining Average Grain Size

3. General Requirements For Delivery

3.1 Material furnished under this specification shall conform to the requirements of the current edition of Specification A 6/A 6M for the ordered material, unless a conflict exists, in which case this specification shall prevail.

4. Materials and Manufacture

4.1 The steel shall be killed, and such shall be affirmed in the test report by a statement of *killed steel*, a value of 0.10 % or more for the silicon content, or a value of 0.015 % or more for the total aluminum content.

4.2 The steelmaking practice used shall be one that produces steel having a nitrogen content not greater than 0.015 % and includes the addition of one or more nitrogen-binding elements, or one that produces steel having a nitrogen content not greater than 0.012 % (with or without the addition of nitrogen-binding elements). The nitrogen content need not be reported, regardless of which steelmaking practice was used.

5. Chemical Composition

5.1 The heat analysis shall conform to the requirements in Table 1.

5.2 In addition to the elements listed in Table 1, test reports shall include, for information, the chemical analysis for tin. Where the amount of tin is less than 0.02 %, it shall be permissible for the analysis to be reported as "< 0.02 %."

5.3 The steel shall conform on product analysis to the requirements prescribed in Table 1, subject to the product analysis tolerances in Specification A 6/A 6M.

5.4 The maximum permissible carbon equivalent value shall be 0.47 % for shapes with flange thickness over 2 in. [50 mm], and 0.45 % in other shapes. The carbon equivalent value shall be based on heat analysis. The required chemical analysis as well as the carbon equivalent shall be reported. The carbon equivalent shall be calculated using the following formula:

$$CE = C + (Mn)/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 \quad (1)$$

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.02 on Structural Steel for Bridges, Buildings, Rolling Stock, and Ships.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard.**

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TABLE 1 Chemical Requirements (Heat Analysis)

Element	Composition, %
Carbon, max	0.23
Manganese,	0.50 to 1.50[A]
Silicon, max	0.40
Vanadium, max	0.15[B]
Columbium, max	0.05[B]
Phosphorus, max	0.035
Sulfur, max	0.045
Copper, max	0.60
Nickel, max	0.45
Chromium, max	0.35
Molybdenum, max	0.15

[A] Provided that the ratio of manganese to sulfur is not less than 20 to 1, the minimum limit for manganese for shapes with flange or leg thickness not exceeding 1 in. [25 mm] shall be 0.30 %.

[B] The sum of columbium and vanadium shall not exceed 0.15 %.

6. Tensile Requirements

6.1 The material as represented by the test specimens shall conform to the requirements for tensile properties prescribed in Table 2.

7. Keywords

7.1 bridges; building framing; shapes; structural steel; welded construction

TABLE 2 Tensile Requirements

Tensile strength, min ksi [MPa]	65 [450]
Yield point, ksi [MPa]	50 to 65 [345 to 450]
Yield to tensile ratio, max	0.85
Elongation in 8 in. [200 mm], min, %[A]	18
Elongation in 2 in. [50 mm], min, %[A]	21

[A] See elongation requirement adjustments under the Tension Tests section of Specification A 6/A 6M.

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall apply only if specified in the purchase order or contract.

Standardized supplementary requirements for use at the option of the purchaser are listed in Specification A 6/A 6M. Those that are considered suitable for use with this specification are listed by title:

S1. Vacuum Treatment

S2. Product Analysis

S5. Charpy V-Notch Impact Test

S8. Ultrasonic Examination

In addition, the following optional supplementary requirements are suitable for use with this specification.

S30. Charpy V-Notch Impact Test for Structural Shapes: Alternate Core Location

S32. Single Heat Bundles.

S32.1 Bundles containing shapes or bars shall be from a single heat of steel.

S79. Maximum Tensile Strength

S79.1 The maximum tensile strength shall be 90 ksi [620 MPa].

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 992/A 992M – 04) that may impact the use of this standard. (Approved Sept. 1, 2004.)

(1) Numeric value of vanadium maximum increased from 0.11 to 0.15 in Table 1.

Committee A01 has identified the location of selected changes to this standard since the last issue (A 992/A 992M – 03) that may impact the use of this standard. (Approved April 1, 2004.)

(1) Supplementary Requirement S32 was added.

(2) 4.2 and Table 1 were revised.

Committee A01 has identified the location of selected changes to this standard since the last issue (A 992/A 992M – 02) that may impact the use of this standard. (Approved May 10, 2004.)

(1) Paragraph 5.4 and Table 1 were revised.

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